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1. Introduction

N_2 is widely used in various applications for micro- and nano electronic industry. Despite of extensive studies of N_2 in various plasma sources there is yet a large interest in large area devices that can operate at pressures below 10 mTorr mainly to be used for plasma immersion ion implantation, PE-CVD, PA-PVD and ion beam extraction. Recently a new type of plasma source has been developed based distributed ECR plasma cells [1]. So far it was successfully used for large area electron beam extraction [2], synthesis of different alloys, nanostructured films and negative ion production [3]. The present work investigates the N_2 dissociation in a 3x4 matrix configuration of ECR plasma cells operating in a pressure range from 10 mTorr down to 0.5 mTorr using mass spectrometry, optical emission spectroscopy and probes.

2. Experiments

The measurements have been performed in a 40×40×40 cm vacuum chamber with 12 ECR plasma cells placed in a 3×4 configuration at the top [3]. Microwave power form a 2.45 GHz generator was split in 12 channels with a divider such as the power injected in each cell can be controlled independently. A magnetic filter placed 70 mm below the cells is used to reduce the electron temperature.

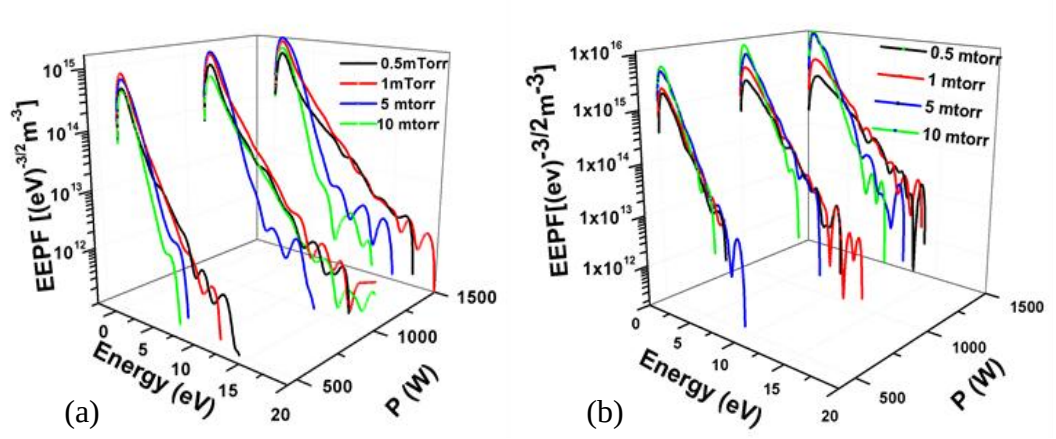

Fig 1 EEPF for different discharge powers and pressures (a) without and (b) with magnetic filter.

Probe measurements show a clear difference in the electron energy probability function (EPPF) with a bi-Maxwellian distribution without magnetic filter and single Maxwellian with magnetic filter as shown in Fig. 1. Mass spectrometry and OES are used to evaluate the N_2 dissociation.

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